

# The Value of Tropical Plant Diversity<sup>1</sup>

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## A Living Gallery of Tropical Plant Species on a University Campus

Plant diversity is valuable economically for cultivation and production, biologically for genetic diversity, environmentally for provision and regulation of ecosystem functions, and culturally for aesthetics provided by agricultural, natural, and ornamental landscapes. The UF/IFAS Tropical Research and Education Center (UF/IFAS TREC) in Homestead is home to a large diversity of plants (<https://trec.ifas.ufl.edu/>). The plant diversity of UF/IFAS TREC represents a long history of research, teaching, and Extension in tropical fruits, vegetables, and ornamentals. UF/IFAS TREC was established in 1929 on relatively undisturbed land (UF/IFAS TREC 2017). Since then, a primary mission has been the purposeful introduction and cultivation of new plant species. Some plants occur at UF/IFAS TREC as collections or for research purposes, while others are found due to natural or accidental means of introduction. Many naturally occurring plant species represent UF/IFAS TREC's globally unique, preserved areas: native pine rockland and rockdale hammock. Plants assemble into groups associated with habitats, which result from human activities and environmental interactions. Digging, planting, and cutting are human activities that affect UF/IFAS TREC plant distributions, while environmental factors include disturbance, soil, moisture, light, and temperature levels. The complete list of UF/IFAS TREC plants is available (<https://doi.org/10.6084/m9.figshare.6653393>) with information on each species, including its growth habit, use, habitat, native

and establishment status, and assessment conclusion for invasion risk or status (Brym and Martin 2019; UF/IFAS 2018).

## Environmental Factors Affecting UF/IFAS TREC Plants

Environmental factors act as a filter for the distribution and assemblage of plants. The environment at UF/IFAS TREC is characterized by a subtropical climate with a wet season from May to October, a mean annual temperature of 23.4°C (74.1°F), and a rainfall of 1,650 mm (65 in). It is hot and humid during the summer months, but noticeably cooler and drier during the winter. Near the city of Homestead, UF/IFAS TREC occupies a square plot of land with 160 acres (0.25 mi<sup>2</sup>) of dry tropical lowlands (elevation 3.1 m or 10 ft) overlaid on a globally unique soil type limited to south Florida. The poor, dry, rocky soil at UF/IFAS TREC, called rockdale or Krome gravelly loam, is derived from Miami oolitic limestone occurring in Miami-Dade, Monroe, and parts of Broward County (Nobel et al. 1996; Li 2001). Soil depth varies from mostly rock (less than 10 cm deep) in the pine rocklands and hammocks to agricultural soils (greater than 10 cm deep) in orchards, vegetable fields, and ornamental landscapes. The deeper soils mainly resulted from rock plowing and excavating holes and trenches for agricultural purposes with hand tools, augers, trenchers, and tractors with plow attachments. Cover crops, such as sorghum-sudangrass hybrids (*Sorghum bicolor* (L.) Moench x *S. bicolor* var. *sudanese*) and sunn hemp

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Disturbance at high, medium, low, and minimal levels drives UF/IFAS TREC plant species into specific habitats (Table 1). Plant traits ideal at higher levels of disturbance also tend to be characteristics of weediness: rapid growth, production of large numbers of small seeds, and short generations (Radosevich et al. 1997). However, in minimally disturbed sites at UF/IFAS TREC, native plants are often more common than non-native plants in species and in numbers. In general, the lower the level of disturbance at UF/IFAS TREC, the higher the proportion of plant species and individuals which are native and not weedy.

Other factors affect plant species location, including human decision, connectivity by fences (“mow-free” zones, yet disturbed), soil type (artificial, agricultural, or natural), water and shade (wet and shady vs. dry and open), temperature season for annuals (summer vs. winter), and lighting (dense shade vs. full sun) (Table 1). In addition to intentionally cultivated plants, some species predominate on fences, which are disturbed sites usually protected from mowing and cutting, and allow vines to flourish. Other species are common in rich, highly disturbed, artificial soils, such as those used in plant containers. Amounts of water combined with shade also affect plant species composition and vary from wet (often irrigated) in the shade to dry (non-irrigated), unshaded sites. Some plant species are fast-growing, competitive annuals during either the cool or warm season (“winter” or “summer”). Levels of lighting also affect plant species composition and vary from deep shade in hammocks to open sun in vegetable fields. Some species are found in multiple levels of disturbance, irrigation, seasons, and light, whereas others are limited to the locations where they have been planted. Southern crabgrass (*Digitaria ciliaris* (Retz.) Koeler) exemplifies the former group, while biriba (*Annona mucosa* Jacq.) represents the latter. Fewer rare than common plant species (and individuals) are found at UF/IFAS TREC. However, many locally common species are regionally or globally rare because of the unique environment: for example, the Brazilian jackbean (*Canavalia brasiliensis* Mart. ex Benth.).

## Meeting Diverse Needs through Plant Diversity at UF/IFAS TREC

UF/IFAS TREC plant diversity represents local agricultural, ornamental, and natural areas in the region. The plants are valuable for economic, biological, environmental, and cultural reasons, and they contribute to the overall agroecology of UF/IFAS TREC. Much of the diverse assemblage of plant material at UF/IFAS TREC is intentionally maintained for research, teaching, and Extension programs,

and it helps to ensure a natural and varied agroecosystem. To give a more complete local assessment over time, UF/IFAS TREC plant species will be continually monitored with regular updates to the online database (<https://doi.org/10.6084/m9.figshare.6653393>). Additional efforts to sample plant diversity will be conducted at UF/IFAS TREC and elsewhere to motivate botanical observations across the region and to promote an understanding of the many values of plant diversity.

## For More Information

*Plant Identification and Information Service*: <https://edis.ifas.ufl.edu/pdf/SR/SR02400.pdf>

*Request for Plant Information*: <https://edis.ifas.ufl.edu/publication/sr024>

*How to Identify a Tree*: <https://edis.ifas.ufl.edu/publication/FR296>

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Table 1. Examples of common and rare plant species in each habitat at UF/IFAS TREC.

Disturbance	Common <sup>a</sup>	Rare <sup>b</sup>
High	Spiny amaranth, <i>Amaranthus spinosus</i> L. Southern crabgrass, <i>Digitaria ciliaris</i> (Retz.) Koeler Sunn hemp, <i>Crotalaria juncea</i> L.	Spangletop, <i>Dinebra panicea</i> (Retz.) Peterson & Snow
Medium	Sapodilla, <i>Manilkara zapota</i> (L.) P. Royen Common fanpetals, <i>Sida ulmifolia</i> Mill. Bahigrass, <i>Paspalum notatum</i> Flügge	<i>Annona mucosa</i> Jacq. Panama hat palm, <i>Carludovicapalmata</i> Ruiz & Pav. Pineland false buttonweed, <i>Spermacoce tetraquetra</i> A. Rich.
Low	Jack-in-the-bush, <i>Chromalaena odorata</i> (L.) King & Rob. Lantana, <i>Lantana strigocamara</i> R.W. Sanders Beggarticks, <i>Bidens alba</i> (L.) DC.	Unknown
Minimal	Slash pine, <i>Pinus elliottii</i> Engelm. Cardinal airplant, <i>Tillandsia fasciculata</i> Sw. Burmareed, <i>Neyraudia reynaudiana</i> (Kunth) Keng ex Hitchc.	Pineland clustervine, <i>Jacquemontia curtisii</i> Peter ex Hallier f. Rockland noseburn, <i>Tragia saxicola</i> Small
<b>Other bases of species assemblage.</b>		
Human decision	Avocado, <i>Persea americana</i> Mill. Tomato, <i>Solanum lycopersicum</i> L.	Biriba, <i>Annona mucosa</i> Jacq. Panama hat palm, <i>Carludovica palmata</i> Ruiz & Pav.
Connectivity by fences	Brazilian jasmine, <i>Jasminum fluminense</i> Vell. Balsampear, <i>Momordica charantia</i> L.	Unknown
Artificial soils	Purple amaranth, <i>Amaranthus blitum</i> L. Hammock sandmat, <i>Euphorbia [Chamaesyce] ophthalmica</i> Pers.	Silver dollar plant, <i>Crassula arborescens</i> (Mill.) Willd.
Wet, shady lawns	Hilograss, <i>Paspalum conjugatum</i> Bergius Herb-of-grace, <i>Bacopa monnieri</i> (L.) Pennell	Unknown
Winter annuals	Mexican pricklypoppy, <i>Argemone Mexicana</i> L. Marsh parsley, <i>Cyclosporum leptophyllum</i> (Pers.) Sprague ex Britton & P.Wilson	Unknown
Summer annuals	Winged paspalum, <i>Paspalum fimbriatum</i> Kunth Itchgrass, <i>Rottboellia cochinchinensis</i> (Lour.) Clayton	Spangletop, <i>Dinebra panicea</i> (Retz.) Peterson & Snow Rockland morning glory, <i>Ipomoea tenuissima</i> Choisy
Dim light	Gold coast jasmine, <i>Jasminum dichotomum</i> Vahl Two-lobe passionflower, <i>Passiflora biflora</i> Lam.	West Indian cherry, <i>Prunus myrtifolia</i> (L.) Urb. Ribbed paspalum, <i>Paspalum malacophyllum</i> Trin.
Bright light	Spiny amaranth, <i>Amaranthus spinosus</i> L. Cutleaf evening primrose, <i>Oenothera laciniata</i> Hill	Spangletop, <i>Dinebra panicea</i> (Retz.) Peterson & Snow Rockland noseburn, <i>Tragia saxicola</i> Small
<sup>a</sup> Common species: frequently encountered in the Homestead area. <sup>b</sup> Rare, established species: listed as rare in Wunderlin and Hansen (2011). <sup>b</sup> Rare, non-established (cultivated only): infrequently encountered in the Homestead area or at UF/IFAS TREC.		